



Analytical Laboratory

Analytical Laboratory
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13339 Hagers Ferry Road
Huntersville, NC 28078-7929
McGuire Nuclear Complex - MG03A2
Phone: 980-875-5245 Fax: 980-875-4349

Order Summary Report

Order Number: J11070122

Project Name: WWTS - Biweekly

Customer Name(s): FGD WWTS

Customer Address: 3195 Pine Hall Rd
Mailcode: Belews Steam Station
Belews Creek, NC 28012

Lab Contact: Jason C Perkins Phone: 980-875-5348

Report Authorized By: _____ **Date:** 7/29/2011
(Signature)

Program Comments:

FGD Bi Monthly

There was detectable Se in the filter blank sample. Sample results were all greater than 10 times the filter blank value. Data OK to report.

Data Flags & Calculations:

Any analytical tests or individual analytes within a test flagged with an "X" or "1" indicate a deviation from the method quality system or quality control requirement. All results are reported on a dry weight basis unless otherwise noted.

Data Package:

This data package includes analytical results that are applicable only to the samples described in this narrative. An estimation of the uncertainty of measurement for the results in the report is available upon request. This report shall not be reproduced, except in full, without the written consent of the Analytical Laboratory. Please contact the Analytical laboratory with any questions. The order of individual sections within this report is as follows:

Job Summary Report, Sample Identification, Technical Validation of Data Package, Analytical Laboratory Certificate of Analysis, Analytical Laboratory QC Reports, Sub-contracted Laboratory Results, Customer Specific Data Sheets, Reports & Documentation, Customer Database Entries, Test Case Narratives, Chain of Custody (COC)

Certification:

The Analytical Laboratory holds the following State Certifications : North Carolina (DENR) Certificate #248, South Carolina (DHEC) Laboratory ID # 99005. Contact the Analytical Laboratory for definitive information about the certification status of specific methods.

Sample ID's & Descriptions:

Sample ID	Plant/Station	Collection Date and Time	Collected By	Sample Description
2011015065	BELEWS	13-Jul-11 8:00 AM	T. Johnson	FGD Purge Eff
2011015066	BELEWS	13-Jul-11 8:00 AM	T. Johnson	EQ TANK EFF.
2011015067	BELEWS	13-Jul-11 8:00 AM	T. Johnson	BIOREACTOR 1 INF.
2011015068	BELEWS	13-Jul-11 8:00 AM	T. Johnson	BIOREACTOR 2 INF.
2011015069	BELEWS	13-Jul-11 8:00 AM	T. Johnson	BIOREACTOR 2 EFF.
2011015070	BELEWS	13-Jul-11 8:00 AM	T. Johnson	Trip Blank
2011015071	BELEWS	13-Jul-11 8:00 AM	T. Johnson	FILTER BLANK
2011015072	BELEWS	13-Jul-11 1:00 PM	DAVID MORRIS	BIOREACTOR 1 INF.
2011015073	BELEWS	13-Jul-11 1:00 PM	DAVID MORRIS	HG BLANK BIOREACTOR 1 INF.
2011015074	BELEWS	13-Jul-11 1:10 PM	DAVID MORRIS	BIOREACTOR 2 INF.
2011015075	BELEWS	13-Jul-11 1:10 PM	DAVID MORRIS	Hg Blk BioReactor 2 Inf
2011015076	BELEWS	13-Jul-11 1:05 PM	DAVID MORRIS	BIOREACTOR 2 EFF.
2011015077	BELEWS	13-Jul-11 1:05 PM	DAVID MORRIS	Hg Blk BioReactor 2 Eff
13 Total Samples				

Technical Validation Review

Checklist:

COC and .pdf report are in agreement with sample totals and analyses (compliance programs and procedures).

☒ Yes

☐ No

All Results are less than the laboratory reporting limits.

☐ Yes

☒ No

All laboratory QA/QC requirements are acceptable.

☒ Yes

☐ No

The Vendor Laboratories have been qualified by the Analytical Laboratory

N/A

Report Sections Included:

☒ Job Summary Report

☒ Sample Identification

☒ Technical Validation of Data Package

☒ Analytical Laboratory Certificate of Analysis

☐ Analytical Laboratory QC Report

☒ Sub-contracted Laboratory Results

☐ Customer Specific Data Sheets, Reports, & Documentation

☐ Customer Database Entries

☐ Test Case Narratives

☒ Chain of Custody

☐ Electronic Data Deliverable (EDD) Sent Separately

Reviewed By: Mary Ann Ogle

Date: 7/29/2011

Certificate of Laboratory Analysis*This report shall not be reproduced, except in full.***Order # J11070122**Site: FGD Purge Eff
Collection Date: 13-Jul-11 8:00 AMSample #: **2011015065**
Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	Method	Analysis Date/Time	Analyst
<u>MERCURY (COLD VAPOR) IN WATER</u>							
Mercury (Hg)	175	ug/L		5	EPA 245.1	22-Jul-11 11:22	AGIBBS
<u>TOTAL RECOVERABLE METALS BY ICP</u>							
Boron (B)	138	mg/L		0.5	EPA 200.7	27-Jul-11 12:48	DJSULL1
<u>DISSOLVED METALS BY ICP-MS</u>							
Selenium (Se)	3330	ug/L		10	EPA 200.8	26-Jul-11 11:22	KRICHAR
<u>TOTAL RECOVERABLE METALS BY ICP-MS</u>							
Arsenic (As)	236	ug/L		10	EPA 200.8	19-Jul-11 12:32	KRICHAR
Chromium (Cr)	287	ug/L		10	EPA 200.8	19-Jul-11 12:32	KRICHAR
Copper (Cu)	237	ug/L		10	EPA 200.8	19-Jul-11 12:32	KRICHAR
Nickel (Ni)	358	ug/L		10	EPA 200.8	19-Jul-11 12:32	KRICHAR
Selenium (Se)	4870	ug/L		10	EPA 200.8	19-Jul-11 12:32	KRICHAR
Silver (Ag)	< 10	ug/L		10	EPA 200.8	19-Jul-11 12:32	KRICHAR
Zinc (Zn)	524	ug/L		20	EPA 200.8	19-Jul-11 12:32	KRICHAR
<u>SELENIUM SPECIATION</u>							
Vendor Parameter	Complete				V_AS&C		
<u>TOTAL DISSOLVED SOLIDS</u>							
TDS	19000	mg/L		10	SM2540C	20-Jul-11 14:45	CLEEMAN

Site: EQ TANK EFF.
Collection Date: 13-Jul-11 8:00 AMSample #: **2011015066**
Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	Method	Analysis Date/Time	Analyst
<u>MERCURY (COLD VAPOR) IN WATER</u>							
Mercury (Hg)	166	ug/L		2.5	EPA 245.1	22-Jul-11 11:24	AGIBBS
<u>TOTAL RECOVERABLE METALS BY ICP</u>							
Boron (B)	147	mg/L		0.5	EPA 200.7	27-Jul-11 12:52	DJSULL1
<u>DISSOLVED METALS BY ICP-MS</u>							
Selenium (Se)	2890	ug/L		10	EPA 200.8	26-Jul-11 11:06	KRICHAR
<u>TOTAL RECOVERABLE METALS BY ICP-MS</u>							
Arsenic (As)	223	ug/L		10	EPA 200.8	19-Jul-11 12:27	KRICHAR
Chromium (Cr)	277	ug/L		10	EPA 200.8	19-Jul-11 12:27	KRICHAR
Copper (Cu)	228	ug/L		10	EPA 200.8	19-Jul-11 12:27	KRICHAR
Nickel (Ni)	294	ug/L		10	EPA 200.8	19-Jul-11 12:27	KRICHAR

Certificate of Laboratory Analysis

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Analytical Laboratory
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Order # J11070122

Site: EQ TANK EFF.

Collection Date: 13-Jul-11 8:00 AM

Sample #: 2011015066

Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	Method	Analysis Date/Time	Analyst
TOTAL RECOVERABLE METALS BY ICP-MS							
Selenium (Se)	4940	ug/L		10	EPA 200.8	19-Jul-11 12:27	KRICHAR
Silver (Ag)	< 10	ug/L		10	EPA 200.8	19-Jul-11 12:27	KRICHAR
Zinc (Zn)	448	ug/L		20	EPA 200.8	19-Jul-11 12:27	KRICHAR

Site: BIOREACTOR 1 INF.

Collection Date: 13-Jul-11 8:00 AM

Sample #: 2011015067

Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	Method	Analysis Date/Time	Analyst
TOTAL RECOVERABLE METALS BY ICP							
Boron (B)	147	mg/L		0.5	EPA 200.7	27-Jul-11 12:26	DJSULL1
DISSOLVED METALS BY ICP-MS							
Selenium (Se)	136	ug/L		10	EPA 200.8	26-Jul-11 10:44	KRICHAR
TOTAL RECOVERABLE METALS BY ICP-MS							
Arsenic (As)	< 10	ug/L		10	EPA 200.8	19-Jul-11 12:22	KRICHAR
Chromium (Cr)	< 10	ug/L		10	EPA 200.8	19-Jul-11 12:22	KRICHAR
Copper (Cu)	< 10	ug/L		10	EPA 200.8	19-Jul-11 12:22	KRICHAR
Nickel (Ni)	12.9	ug/L		10	EPA 200.8	19-Jul-11 12:22	KRICHAR
Selenium (Se)	152	ug/L		10	EPA 200.8	19-Jul-11 12:22	KRICHAR
Silver (Ag)	< 10	ug/L		10	EPA 200.8	19-Jul-11 12:22	KRICHAR
Zinc (Zn)	< 20	ug/L		20	EPA 200.8	19-Jul-11 12:22	KRICHAR
SELENIUM SPECIATION							
Vendor Parameter	Complete			V_AS&C			

Site: BIOREACTOR 2 INF.

Collection Date: 13-Jul-11 8:00 AM

Sample #: 2011015068

Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	Method	Analysis Date/Time	Analyst
TOTAL RECOVERABLE METALS BY ICP							
Boron (B)	147	mg/L		0.5	EPA 200.7	27-Jul-11 12:31	DJSULL1
TOTAL RECOVERABLE METALS BY ICP-MS							
Arsenic (As)	< 10	ug/L		10	EPA 200.8	19-Jul-11 12:17	KRICHAR
Chromium (Cr)	< 10	ug/L		10	EPA 200.8	19-Jul-11 12:17	KRICHAR
Copper (Cu)	< 10	ug/L		10	EPA 200.8	19-Jul-11 12:17	KRICHAR
Nickel (Ni)	< 10	ug/L		10	EPA 200.8	19-Jul-11 12:17	KRICHAR
Selenium (Se)	23.9	ug/L		10	EPA 200.8	19-Jul-11 12:17	KRICHAR
Silver (Ag)	< 10	ug/L		10	EPA 200.8	19-Jul-11 12:17	KRICHAR
Zinc (Zn)	< 20	ug/L		20	EPA 200.8	19-Jul-11 12:17	KRICHAR

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Sample #: 2011015069
Matrix: OTHER

SELENIUM SPECIATION

Vendor Parameter	Complete
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V_AS&C

Sample #: 2011015070
Matrix: OTHER

SELENIUM SPECIATION

Vendor Parameter	Complete
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V_AS&C

Sample #: 2011015071
Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	Method	Analysis Date/Time	Analyst
DISSOLVED METALS BY ICP-MS							

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Analyte	Result	Units	Qualifiers	RDL	Method	Analysis Date/Time	Analyst
<u>DISSOLVED METALS BY ICP-MS</u>							
Selenium (Se)	2.38	ug/L		2	EPA 200.8	26-Jul-11 10:34	KRICHAR

Analyte	Result	Units	Qualifiers	RDL	Method	Analysis Date/Time	Analyst
<u>MERCURY 1631</u>							
Vendor Parameter	Complete				V_BRAND		
<u>MERCURY 1631 - DISSOLVED</u>							
Vendor Parameter	Complete				V_BRAND		

Analyte	Result	Units	Qualifiers	RDL	Method	Analysis Date/Time	Analyst
<u>MERCURY 1631</u>							
Vendor Parameter	Complete				V_BRAND		
<u>MERCURY 1631 - DISSOLVED</u>							
Vendor Parameter	Complete				V_BRAND		

Analyte	Result	Units	Qualifiers	RDL	Method	Analysis Date/Time	Analyst
<u>MERCURY 1631</u>							
Vendor Parameter	Complete				V_BRAND		
<u>MERCURY 1631 - DISSOLVED</u>							
Vendor Parameter	Complete				V_BRAND		

Analyte	Result	Units	Qualifiers	RDL	Method	Analysis Date/Time	Analyst
<u>MERCURY 1631</u>							
Vendor Parameter	Complete				V_BRAND		
<u>MERCURY 1631 - DISSOLVED</u>							

Certificate of Laboratory Analysis

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Order # J11070122

Site: Hg Blk BioReactor 2 Inf

Collection Date: 13-Jul-11 1:10 PM

Sample #: 2011015075

Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	Method	Analysis Date/Time	Analyst
<u>MERCURY 1631 - DISSOLVED</u>							
Vendor Parameter	Complete				V_BRAND		

Site: BIOREACTOR 2 EFF.

Collection Date: 13-Jul-11 1:05 PM

Sample #: 2011015076

Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	Method	Analysis Date/Time	Analyst
<u>MERCURY 1631</u>							
Vendor Parameter	Complete				V_BRAND		
<u>MERCURY 1631 - DISSOLVED</u>							
Vendor Parameter	Complete				V_BRAND		

Site: Hg Blk BioReactor 2 Eff

Collection Date: 13-Jul-11 1:05 PM

Sample #: 2011015077

Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	Method	Analysis Date/Time	Analyst
<u>MERCURY 1631</u>							
Vendor Parameter	Complete				V_BRAND		
<u>MERCURY 1631 - DISSOLVED</u>							
Vendor Parameter	Complete				V_BRAND		



**APPLIED SPECIATION
AND CONSULTING, LLC**

18804 Northcreek Parkway Bothell, WA, 98011
Tel: (425) 483-3300 Fax: (425) 483-9818
www.appliedspeciation.com

July 20, 2011

Jay Perkins
Duke Energy Analytical Laboratory
Mail Code MGO3A2 (Building 7405)
13339 Hagers Ferry Rd.
Huntersville, NC 28078
(704) 875-5245

Project: Belews – FGD (WWTS Bi-Monthly Sampling) (LIMS # J11070122)

Dear Mr. Perkins,

Attached is the report associated with four (4) aqueous samples submitted for selenium speciation analysis on July 14, 2011. The samples were received in a sealed cooler at -0.4°C on July 15, 2011. Selenium speciation analysis was performed via ion chromatography inductively coupled plasma dynamic reaction cell mass spectrometry (IC-ICP-DRC-MS). Any issues associated with the analysis are addressed in the following report.

If you have any questions, please feel free to contact me at your convenience.

Sincerely,

A handwritten signature in black ink that reads "Ben Wozniak". The signature is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

Ben Wozniak
Project Manager
Applied Speciation and Consulting, LLC

Applied Speciation and Consulting, LLC

Report prepared for:

Jay Perkins
Duke Energy Analytical Laboratory
Mail Code MGO3A2 (Building 7405)
13339 Hagers Ferry Rd.
Huntersville, NC 28078

Project: Belews – FGD (WWTS Bi-Monthly Sampling) (LIMS # J11070122)

July 20, 2011

1. Sample Reception

Four (4) aqueous samples in 125mL HDPE bottles (provided by Applied Speciation and Consulting) were submitted for selenium speciation analysis on July 14, 2011. The samples were received on July 15, 2011 in a sealed container at -0.4°C.

The samples were received in a laminar flow clean hood void of trace metals contamination and ultra-violet radiation. Upon reception, the samples were designated discrete sample identifiers. An aliquot of each sample was filtered (0.45µm) and these filtrates were stored in a secure, monitored cryofreezer (maintained at a temperature of -80°C) until selenium speciation analysis could be performed via ion chromatography inductively coupled plasma dynamic reaction cell mass spectrometry (IC-ICP-DRC-MS).

2. Sample Preparation

All sample preparation is performed in laminar flow clean hoods known to be free from trace metals contamination. All applied water for dilutions and sample preservatives are monitored for contamination to account for any biases associated with the sample results.

Selenium Speciation Analysis by IC-ICP-DRC-MS Prior to analysis, an aliquot of each sample was filtered with a syringe filter (0.45µm) and injected directly into a sealed autosampler vial. No further sample preparation was performed as any chemical alteration of the samples may shift the equilibrium of the system resulting in changes in speciation ratios.

3. Sample Analysis

All sample analysis is preceded by a minimum of a five-point calibration curve spanning the entire concentration range of interest. Calibration curves are performed at the beginning of

each analytical day. All calibration curves, associated with each species of interest, are standardized by linear regression resulting in a response factor. All sample results are **instrument blank corrected** to account for any operational biases associated with the analytical platform.

Prior to sample analysis, all calibration curves are verified using second source standards which are identified as initial calibration verification standards (ICV).

Ongoing instrument performance is identified by the analysis of continuing calibration verification standards (CCV) and continuing calibration blanks (CCB) at a minimal interval of every ten analytical runs.

Selenium Speciation Analysis by IC-ICP-DRC-MS All samples for selenium speciation analysis were analyzed by ion chromatography inductively coupled plasma dynamic reaction cell mass spectrometry (IC-ICP-DRC-MS) on July 15, 2011. An aliquot of each sample is injected onto an anion exchange column and mobilized by a basic ($\text{pH} > 7$) gradient. The eluting selenium species are then introduced into a radio frequency (RF) plasma where energy-transfer processes cause desolvation, atomization, and ionization. The ions are extracted from the plasma through a differentially-pumped vacuum interface and travel through a pressurized chamber (DRC) containing a specific reactive gas which preferentially reacts with interfering ions of the same target mass to charge ratios (m/z). A solid-state detector detects ions transmitted through the mass analyzer and the resulting current is processed by a data handling system.

Retention times for each eluting species are compared to known standards for species identification.

4. Analytical Issues

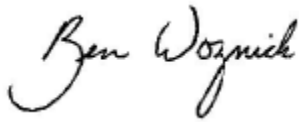
The overall analyses went very well and no significant analytical issues were encountered. All quality control parameters associated with these samples were within acceptance limits.

The estimated method detection limits (eMDLs) for selenite, selenate, and selenocyanate are generated from replicate analyses of the lowest standard in the calibration curve. Not all selenium species are present in preparation blanks; therefore, eMDL calculations based on preparation blanks are artificially biased low.

The eMDL for methylseleninic acid and selenomethionine is calculated from the average eMDL of selenite, selenate, and selenocyanate. The calibration does not contain methylseleninic acid or selenomethionine due to impurities in these standards which would bias the results for other selenium species.

If you have any questions or concerns regarding this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink that reads "Ben Wozniak". The signature is written in a cursive style with a large, looping "B" and a trailing flourish.

Ben Wozniak
Project Manager
Applied Speciation and Consulting, LLC

Selenium Speciation Results for Duke Energy
Project Name: Belews - FGD (WWTS Bi-Monthly Sampling)
Contact: Jay Perkins
LIMS #J11070122

Date: July 20, 2011
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Sample Results

Sample ID	Se(IV)	Se(VI)	SeCN	MeSe(IV)	SeMe	Unknown Se Species (n)
FGD Purge Eff	211	103	ND (<3.4)	ND (<2.4)	ND (<2.4)	0 (0)
BioReactor 1 Inf	25.5	87.8	ND (<0.85)	1.06	ND (<0.59)	0 (0)
BioReactor 2 Eff	ND (<0.28)	ND (<0.64)	ND (<0.85)	ND (<0.59)	ND (<0.59)	0 (0)
Metals Trip Blk	ND (<0.055)	ND (<0.13)	ND (<0.17)	ND (<0.12)	ND (<0.12)	0 (0)

All results reflect the applied dilution and are reported in µg/L

ND = Not detected at the applied dilution

SeCN = Selenocyanate

MeSe(IV) = Methylseleninic acid

SeMe = Selenomethionine

Unknown Se Species = Total concentration of all unknown Se species observed by IC-ICP-MS

n = number of unknown Se species observed

Selenium Speciation Results for Duke Energy
Project Name: Belews - FGD (WWTS Bi-Monthly Sampling)
Contact: Jay Perkins
LIMS #J11070122

Date: July 20, 2011
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Preparation Blank Summary

Analyte (µg/L)	PBW1	PBW2	PBW3	PBW4	Mean	StdDev	eMDL*	eMDL 10x	eMDL 50x	eMDL 200x
Se(IV)	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.055	0.28	1.1
Se(VI)	0.000	0.000	0.000	0.000	0.000	0.000	0.013	0.13	0.64	2.6
SeCN	0.000	0.000	0.000	0.000	0.000	0.000	0.017	0.17	0.85	3.4
MeSe(IV)	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.12	0.59	2.4
SeMe	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.12	0.59	2.4

eMDL = Estimated Method Detection Limit

*Please see narrative regarding eMDL calculations

Quality Control Summary - Certified Reference Materials

Analyte (µg/L)	CRM	True Value	Result	Recovery
Se(IV)	LCS	9.57	10.16	106.2
Se(VI)	LCS	9.48	9.786	103.2
SeCN	LCS	8.92	8.875	99.5
MeSe(IV)	LCS	6.47	6.446	99.6
SeMe	LCS	9.32	9.379	100.6

Selenium Speciation Results for Duke Energy
Project Name: Belews - FGD (WWTS Bi-Monthly Sampling)
Contact: Jay Perkins
LIMS #J11070122

Date: July 20, 2011
Report Generated by: Ben Wozniak
Applied Speciation and Consulting, LLC

Quality Control Summary - Matrix Duplicates

Analyte (µg/L)	Sample ID	Rep 1	Rep 2	Mean	RPD
Se(IV)	BioReactor 2 Eff	ND (<0.28)	ND (<0.28)	NC	NC
Se(VI)	BioReactor 2 Eff	ND (<0.64)	ND (<0.64)	NC	NC
SeCN	BioReactor 2 Eff	ND (<0.85)	ND (<0.85)	NC	NC
MeSe(IV)	BioReactor 2 Eff	ND (<0.59)	ND (<0.59)	NC	NC
SeMe	BioReactor 2 Eff	ND (<0.59)	ND (<0.59)	NC	NC

ND = Not detected at the applied dilution

NC = Value was not calculated due to one or more concentrations below the eMDL

Quality Control Summary - Matrix Spike/ Matrix Spike Duplicate

Analyte (µg/L)	Sample ID	Spike Conc	MS Result	Recovery	Spike Conc	MSD Result	Recovery	RPD
Se(IV)	BioReactor 2 Eff	278.0	270.2	97.2	278.0	268.7	96.7	0.5
Se(VI)	BioReactor 2 Eff	252.3	239.7	95.0	252.3	239.3	94.9	0.2
SeCN	BioReactor 2 Eff	228.8	205.6	89.9	228.8	205.2	89.7	0.2

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST FORM

Analytical Laboratory

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DISTRIBUTION
ORIGINAL to LAB,
COPY to CLIENT

Duke Energy Analytical Laboratory

Mail Code MGO3A2 (Building 7405)
13339 Hagers Ferry Rd
Huntersville, N. C. 28078
(704) 875-5245
Fax: (704) 875-4349

Analytical Laboratory Use Only

ORDER# J11070122

MATRIX: OTHER

Samples
Originating
FromNC
SC

Logged By

Date & Time

Am

7-14-11

807

SAMPLE PROGRAM

Ground
NPDES

Water

Drinking Water
UST

RCRA Waste

AS&C

PO#133241

Cooler Temp (C)

13 Preserv.: 1=HCL
2=H₂SO₄ 3=HNO₃
4=Ice 5=None

MR #

Customer to complete all
appropriate non-shaded areas.

Sampling conducted: 2nd and 4th Wednesday

Date	Time	Signature
7/13	0800	T. Johnson
7/13	0800	T. Johnson
7/13	0800	T. Johnson
7/13	0800	T. Johnson
7/13	0800	T. Johnson
7/13	0800	T. Johnson

17 Comp.

18 Grab

TDS

Hg - 245.1

Metals*

Se, soluble (no dig.)**

Se, speciation - vendor to AS&C (Important to place filled bottle back into both baggies)

Filtering of the Se is performed in the field please provide a filter blank too.

** send field coll. bottles for sol. Se

LAB USE ONLY

11 Lab ID

2011015065
64
67
68
69
71
70

Se Speciation Bottle

ID

13 Sample Description or ID

FGD Purge Eff

EQ Tank Eff.

BioReactor 1 Inf

BioReactor 2 Inf

BioReactor 2 Eff

(lab supplies all blank H2O)

(sequence) Filter Blk

Metals Trip Blk

Customer to sign & date below - fill out from left to right.

1) Relinquished By

Tom Johnson

Date/Time

7/13/11 9:57 AM

2) Accepted By

D. Moore

Date/Time

7-13-11 12:55

3) Relinquished By

D. Moore 7-13-11

Date/Time

7/13/11 1600

4) Accepted By

D. Moore

Date/Time

7-13-11 1600

5) Relinquished By

D. Moore 7-14-11

Date/Time

7/14/11 1300

6) Accepted By

D. Moore

Date/Time

7-14-11 1300

7) Relinquished By

D. Moore 7-14-11

Date/Time

7/14/11 9:00

8) Accepted By

D. Moore

Date/Time

7-14-11 9:00

9) Seal/Locked By

D. Moore 7-14-11

Date/Time

7/14/11 9:00

10) Seal/Lock Opened By

D. Moore

Date/Time

7-14-11 9:15 - 0.40c

11) Seal/Locked By

D. Moore 7-14-11

Date/Time

7/14/11 9:00

12) Seal/Lock Opened By

D. Moore

Date/Time

7-14-11 9:00

Comments

* B by ICP

As, Ag, Cu, Cr, Ni, Se, Zn by IMS

Digestions = TRM

thomas.d.johnson@siemens.com

Customer, IMPORTANT!
Please indicate desired turnaround.

22 Requested Turnaround

14 Days

* 7 Days

* 48 Hr

* Other

* Add. Cost Will Apply

7-24-11

July 21, 2011

Duke Energy
ATTN: Jay Perkins
Scientific Support-Laboratory
13339 Hagers Ferry Road
Huntersville NC 28078
jcperkins@duke-energy.com
labcustomer@duke-energy.com

RE: Project DUK-HV1101

Client Project: J11070122

Dear Mr. Perkins,

On July 15, 2011, Brooks Rand Labs (BRL) received three (3) flue gas desulfurization (FGD) waste water samples and three (3) corresponding field blanks. Samples were logged-in for total mercury (Hg) analysis and were received, prepared, analyzed, and stored according to BRL SOPs and EPA methodology.

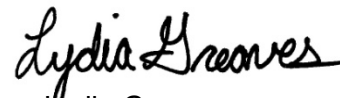
The results were blank-corrected as described in the calculations section of the applicable SOP(s) and may be evaluated using adjusted reporting limits to account for sample aliquot size. Please refer to the *Sample Results* page for sample-specific detection limits and other details. All quality assurance criteria were satisfied, and all data was reported without additional qualification, aside from concentration qualifiers.

BRL, an accredited laboratory, certifies the reported results of all analyses for which BRL is NELAP accredited meet all NELAP requirements. For more details, see the *Report Information* page of the report. Please feel free to contact me if you have any questions regarding this report.

Sincerely,



Tiffany Stillwater
Project Manager
tiffany@brooksrands.com



Lydia Greaves
Jr. Project Manager
lydia@brooksrands.com

Report Information

Laboratory Accreditation

BRL is accredited by the *National Environmental Laboratory Accreditation Program* (NELAP) through the State of Florida Department of Health, Bureau of Laboratories (E87982) and is certified to perform many environmental analyses. BRL is also certified by many other states to perform environmental analyses. For a current list of our accreditations/certifications, please visit our website at <http://www.brooksrand.com/default.asp?contentID=586>. Results reported relate only to the samples listed in the report.

Field Quality Control Samples

Please be notified that certain EPA methods require the collection of field quality control samples of an appropriate type and frequency; failure to do so is considered a deviation from some methods and for compliance purposes should only be done with the approval of regulatory authorities. Please see the specific EPA methods for details regarding required field quality control samples.

Common Abbreviations

BLK	method blank	MS	matrix spike
BRL	Brooks Rand Labs	MSD	matrix spike duplicate
BS	laboratory fortified blank	ND	non-detect
CAL	calibration standard	NR	non-reportable
CCV	continuing calibration verification	PS	post preparation spike
COC	chain of custody record	REC	percent recovery
CRM	certified reference material	RPD	relative percent difference
D	dissolved fraction	RSD	relative standard deviation
DUP	duplicate	SCV	secondary calibration verification
ICV	initial calibration verification	SOP	standard operating procedure
MDL	method detection limit	SRM	standard reference material
MRL	method reporting limit	T	total recoverable fraction

Definition of Data Qualifiers

(Effective 9/23/09)

B	Detected by the instrument, the result is > the MDL but ≤ the MRL. Result is reported and considered an estimate.
E	An estimated value due to the presence of interferences. A full explanation is presented in the narrative.
H	Holding time and/or preservation requirements not met. Result is estimated.
J	Estimated value. A full explanation is presented in the narrative.
J-M	Duplicate precision (RPD) for associated QC sample was not within acceptance criteria. Result is estimated.
J-N	Spike recovery for associated QC sample was not within acceptance criteria. Result is estimated.
M	Duplicate precision (RPD) was not within acceptance criteria. Result is estimated.
N	Spike recovery was not within acceptance criteria. Result is estimated.
R	Rejected, unusable value. A full explanation is presented in the narrative.
U	Result is ≤ the MDL or client requested reporting limit (CRRL). Result reported as the MDL or CRRL.
X	Result is not BLK-corrected and is within 10x the absolute value of the highest detectable BLK in the batch. Result is estimated.

These qualifiers are based on those previously utilized by Brooks Rand, Ltd., those found in the EPA SOW_ILM03.0, Exhibit B, Section III, pg. B-18, and the USEPA Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses; USEPA; July 2002. These supersede all previous qualifiers ever employed by BRL.

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PM: Tiffany Stilwater



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Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
BioReactor 1 Inf	1129042-01	FGD Wastewater	Sample	07/13/2011	07/15/2011
Hg Blk BioReactor 1 Inf	1129042-02	DIW	Field Blank	07/13/2011	07/15/2011
BioReactor 2 Inf	1129042-03	FGD Wastewater	QC Sample	07/13/2011	07/15/2011
Hg Blk BioReactor 2 Inf	1129042-04	DIW	Field Blank	07/13/2011	07/15/2011
BioReactor 2 Eff	1129042-05	FGD Wastewater	Sample	07/13/2011	07/15/2011
Hg Blk BioReactor 2 Eff	1129042-06	DIW	Field Blank	07/13/2011	07/15/2011

Batch Summary

Analyte	Lab Matrix	Method	Prepared	Analyzed	Batch	Sequence
Hg	Water	EPA 1631	07/18/2011	07/20/2011	B111039	1100496

Sample Results

Sample	Analyte	Report Matrix	Fraction	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
BioReactor 1 Inf										
1129042-01	Hg	FGD Wastewater	T	82.7		3.03	8.08	ng/L	B111039	1100496
BioReactor 2 Eff										
1129042-05	Hg	FGD Wastewater	T	24.5		0.77	2.05	ng/L	B111039	1100496
BioReactor 2 Inf										
1129042-03	Hg	FGD Wastewater	T	65.4		3.03	8.08	ng/L	B111039	1100496
Hg Blk BioReactor 1 Inf										
1129042-02	Hg	DIW	T	0.15	U	0.15	0.40	ng/L	B111039	1100496
Hg Blk BioReactor 2 Eff										
1129042-06	Hg	DIW	T	0.15	U	0.15	0.40	ng/L	B111039	1100496
Hg Blk BioReactor 2 Inf										
1129042-04	Hg	DIW	T	0.15	U	0.15	0.40	ng/L	B111039	1100496

Accuracy & Precision Summary

Batch: B111039
Lab Matrix: Water
Method: EPA 1631

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B111039-SRM1	Certified Reference Material (1128019, NIST 1641d 1000x dilution)						
	Hg		15.68	15.39	ng/L	98% 85-115	
B111039-MS3	Matrix Spike (1129042-03)						
	Hg	65.36	323.2	429.8	ng/L	113% 71-125	
B111039-MSD3	Matrix Spike Duplicate (1129042-03)						
	Hg	65.36	323.2	411.2	ng/L	107% 71-125	4% 24

Method Blanks & Reporting Limits

Batch: B111039
Matrix: Water
Method: EPA 1631
Analyte: Hg

Sample	Result	Units
B111039-BLK1	0.08	ng/L
B111039-BLK2	0.10	ng/L
B111039-BLK3	0.07	ng/L
B111039-BLK4	0.05	ng/L
Average: 0.08		Standard Deviation: 0.02
Limit: 0.50		Limit: 0.10
		MDL: 0.15
		MRL: 0.41

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Instrument Calibration

Sequence: 1100496
Instrument: THG-05
Date: 07/20/2011
Analyte: Hg

Total Mercury and Mercury Speciation by CVAFS
Method: EPA 1631

Lab ID	True Value	Result	Units	REC & Limits	
1100496-IBL1		9.55	pg of Hg		
1100496-IBL2		9.37	pg of Hg		
1100496-IBL3		8.12	pg of Hg		
1100496-IBL4		9.29	pg of Hg		
1100496-CAL1	25.00	22.79	pg of Hg	91%	
1100496-CAL2	100.0	100.3	pg of Hg	100%	
1100496-CAL3	500.0	511.3	pg of Hg	102%	
1100496-CAL4	2500	2648	pg of Hg	106%	
1100496-CAL5	10000	10170	pg of Hg	102%	
1100496-ICV1	1568	1539	pg of Hg	98%	85-115
1100496-CCB1		14.7	pg of Hg		
1100496-CCV1	500.0	509.8	pg of Hg	102%	77-123
1100496-CCV2	500.0	507.1	pg of Hg	101%	77-123

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Sample Containers

Lab ID: 1129042-01			Report Matrix: FGD Wastewater			Collected: 07/13/2011	
Sample: BioReactor 1 Inf			Sample Type: Sample			Received: 07/15/2011	
Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-T	125 mL	No Lot #	None	N/A		Cooler
Lab ID: 1129042-02			Report Matrix: DIW			Collected: 07/13/2011	
Sample: Hg Blk BioReactor 1 Inf			Sample Type: Field Blank			Received: 07/15/2011	
Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-T	125 mL	No Lot #	None	N/A		Cooler
Lab ID: 1129042-03			Report Matrix: FGD Wastewater			Collected: 07/13/2011	
Sample: BioReactor 2 Inf			Sample Type: QC Sample			Received: 07/15/2011	
Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-T	250 mL	71313080	None	N/A		Cooler
Comments: About 100 mL Sample Volume			60				
Lab ID: 1129042-04			Report Matrix: DIW			Collected: 07/13/2011	
Sample: Hg Blk BioReactor 2 Inf			Sample Type: Field Blank			Received: 07/15/2011	
Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-T	125 mL	No Lot #	None	N/A		Cooler
Lab ID: 1129042-05			Report Matrix: FGD Wastewater			Collected: 07/13/2011	
Sample: BioReactor 2 Eff			Sample Type: Sample			Received: 07/15/2011	
Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-T	125 mL	No Lot #	None	N/A		Cooler
Lab ID: 1129042-06			Report Matrix: DIW			Collected: 07/13/2011	
Sample: Hg Blk BioReactor 2 Eff			Sample Type: Field Blank			Received: 07/15/2011	
Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-T	125 mL	No Lot #	None	N/A		Cooler

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Shipping Containers

Cooler

Received: July 15, 2011 8:45
Tracking No: 4726 7966 2152 via FedEx
Coolant Type: Ice
Temperature: 1.4 °C

Description: Cooler
Damaged in transit? No
Returned to client? No

Custody seals present? No
Custody seals intact? No
COC present? Yes

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST FORM

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DISTRIBUTION
ORIGINAL to LAB,
COPY to CLIENT



Duke Energy Analytical Laboratory
Mail Code MGO3A2 (Building 7405)
13339 Hagers Ferry Rd
Huntersville, N. C. 28078
(704) 875-5245
Fax: (704) 875-4349

Analytical Laboratory Use Only

ORDER # J11070122	Sample Class OTHER	Samples Originating From NC
Logged By Am	Date & Time 7-14-11 8:07	
V Brooks Rand		COOLER Temp (C) Preserv.: 1=HCL 2=H ₂ SO ₄ 3=HNO ₃ 4=Ice 5=None
PI PO#141391		
IMR #		

Customer to complete all appropriate non-shaded areas.						16 Analyses Required		17 Comp.		18 Grab		19 Hg 1631 (sample 2nd week only)	
Se Speciation Bottle ID	13 Sample Description or ID	Date	Time	Signature									
	BioReactor 1 Inf	7-13-11	1300	Dan Mon									1
	Hg Blk BioReactor 1 Inf												1
	BioReactor 2 Inf		1310										1
	Hg Blk BioReactor 2 Inf												1
	BioReactor 2 Eff		1305										1
	Hg Blk BioReactor 2 Eff												1
Use the Bioreactor 2 Inf or EFF sample as the MS/MSD													

1) Project Name Belews - FGD	2) Phone No:
WWTS (2011, Bi-Weekly Sampling)	
2) Client: Bill Kennedy, Melonie Martin, Wayne Chapman, Tom Johnson *	4) Fax No:
5) Business Unit:	6) Process:
8) Oper. Unit:	9) Res. Type:
	10) Reso. Center:

LAB USE ONLY

11 Lab ID

2011015072
73
74
75
76
77

Se Speciation Bottle

ID

13 Sample Description or ID

Sampling conducted: 2nd Wednesday each month

Date

Time

Signature

17 Comp.

18 Grab

Hg 1631

(sample 2nd week only)

Customer to complete appropriate columns to right

Customer to sign & date below - fill out from left to right.

1) Relinquished By Dan Mon	Date/Time 7-13-11 1600	2) Accepted By A. Moore	Date/Time 7-13-11 1600
3) Relinquished By A. Moore	Date/Time 7-14-11 1300	4) Accepted By Sh. Rah	Date/Time 7-15-11 0845
5) Relinquished By	Date/Time	6) Accepted By:	Date/Time
7) Relinquished By	Date/Time	8) Accepted By:	Date/Time
9) Seal/Locked By A. Moore	Date/Time 7-14-11 9:00	10) Seal/Lock Opened By	Date/Time
11) Seal/Locked By	Date/Time	12) Seal/Lock Opened By	Date/Time

Customer, IMPORTANT!
Please indicate desired turnaround.

22 Requested Turnaround

14 Days

*7 Days

*48 Hr

*Other **7/24/11**

* Add. Cost Will Apply

Comments

* Metals=As, Ag, B, Cu, Cr, Ni, Se, Zn *thomas.d.johnson@siemens.com



Duke Energy Analytical Laboratory

Mail Code MGO3A2 (Building 7405)
13339 Hagers Ferry Rd
Huntersville, N. C. 28078
(704) 875-5245
Fax: (704) 875-4349

Analytical Laboratory Use Only			
ORDER# J11070122	MATRIX: OTHER	Samples Originating From	NC <input checked="" type="checkbox"/> SC <input type="checkbox"/>
Logged By <i>Am</i>	Date & Time 7-14-11	SAMPLE PROGRAM	Ground Water <input type="checkbox"/> Drinking Water <input type="checkbox"/> UST <input type="checkbox"/> RCRA Waste <input type="checkbox"/>
AS&C PO#133241	Cooler Temp (C) 21.0	Preserv.: 1=HCL 2=H ₂ SO ₄ 3=HNO ₃ 4=Ice 5=None	4 3,4 4 3,4 4

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DISTRIBUTION
ORIGINAL to LAB,
COPY to CLIENT

1) Project Name Belews - FGD (WWTS Bi-Monthly Sampling)	2) Phone No:
2) Client: Bill Kennedy, Melonie Martin, Wayne Chapman, Tom Johnson **	4) Fax No:
5) Business Unit:	6) Process: Mail Code:
8) Oper. Unit:	10) Reso. Center:

Customer to complete all
appropriate non-shaded areas.

Sampling conducted: 2nd and 4th Wednesday

Se Speciation Bottle ID	13 Sample Description or ID	Date	Time	Signature	17 Comp.	18 Grab	TDS	Hg - 245.1	Metals*	Se, soluble (no dig.)**	Se, speciation - vendor to AS&C (important to place filled bottle back into both baggies)
	FGD Purge Eff	7/13	0800	T. Johnson		✓	1	1	1	1	1
	EQ Tank Eff.	7/13	0800	T. Johnson	✓			1	1	1	1
	BioReactor 1 Inf	7/13	0800	T. Johnson	✓				1	1	1
	BioReactor 2 Inf	7/13	0800	T. Johnson		✓			1		
	BioReactor 2 Eff	7/13	0800	T. Johnson	✓		1		1		1
	(lab supplies all blank H2O)										
	(sequence) Filter Blk								1		1
	Metals Trip Blk								1		1
	** send field coll. bottles for sol. Se										

Filtering of the Se is performed in the field please provide a filter blank too.

Customer to sign & date below - fill out from left to right.

1) Relinquished By <i>Tom Johnson</i>	Date/Time <i>7/13/11 9:57 AM</i>	2) Accepted By <i>Dan Mon</i>	Date/Time <i>7-13-11 1255</i>
3) Relinquished By <i>Dan Mon</i>	Date/Time <i>7-13-11 1600</i>	4) Accepted By <i>A. Mader</i>	Date/Time <i>7-13-11 1600</i>
5) Relinquished By <i>A. Mader</i>	Date/Time <i>7-14-11 1300</i>	6) Accepted By:	Date/Time
7) Relinquished By	Date/Time	8) Accepted By:	Date/Time
9) Seal/Locked By <i>A. Mader</i>	Date/Time <i>7-14-11 9:00</i>	10) Seal/Lock Opened By	Date/Time
11) Seal/Locked By	Date/Time	12) Seal/Lock Opened By	Date/Time
Comments * B by ICP As, Ag, Cu, Cr, Ni, Se, Zn by IMS Digestions = TRM thomas.d.johnson@siemens.com			

Customer, IMPORTANT!
Please indicate desired turnaround.

22 Requested Turnaround

14 Days _____

*7 Days _____

*48 Hr _____

*Other _____

* Add. Cost Will Apply

7-24-11

Customer must Complete

Customer to complete appropriate columns to right

LAB USE ONLY

11 Lab ID

2011015065
64
67
68
69
71
70

laboratory



Analytical Laboratory Use Only			
ORDER # J11070122	Sample Class OTHER	Samples Originating From	NC SC <input checked="" type="checkbox"/>
Logged By Am	Date & Time 7-14-11 8:07	SAMPLE PROGRAM Ground Water _____ NPDES _____ Drinking Water _____ UST _____ _____ RCRA Waste _____	
Ve _____ Brooks Band		Cooler Temp (C) _____	

[illegible][illegible]

Customer to complete all appropriate non-shaded areas.

[illegible]

Customer to complete appropriate columns to right

Use the Bioreactor 2 Inf or EFF sample as the MS/MSD									
--	--	--	--	--	--	--	--	--	--

Customer, IMPORTANT!
Please indicate desired turnaround.

22 Requested Turnaround

14 Days _____

*7 Days _____

*48 Hr _____

*Other 7/24/11

* Add. Cost Will Apply

Customer, IMPORTANT!
Please indicate desired turnaround.